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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,799	01/12/2007	Emil Edwin	EDWL3002REF	3481
23364 7590 02/02/2010 BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314-1176				
EXAMINER				
MCCRACKEN, DANIEL				
ART UNIT		PAPER NUMBER		
1793				
MAIL DATE		DELIVERY MODE		
02/02/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/579,799

Applicant(s)

EDWIN ET AL.

Examiner

DANIEL C. MCCracken

Art Unit

1793

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 12-36 is/are pending in the application.
- 4a) Of the above claim(s) 12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 13-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Citation to the Specification will be in the following format: (S. # : ¶/L) where # denotes the page number and ¶/L denotes the paragraph number or line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Status of Application

Applicants response dated 11/23/2009 has been received. The amendment to the Specification to make reference to the national stage of an international application described in the Specification will be entered. Claims 1-9 and 12-36 are pending. Claims 10-11 are acknowledged as cancelled. Claims 13-36 are newly presented.

Election/Restrictions

Applicant's election without traverse of Group I, Species A (Claims 1-9 and 13-36) in the reply filed on 11/23/2009 is acknowledged. Claim 12 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention/species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 11/23/2009.

Note that, while Applicants clearly did not elect Claim 12, they did not present the appropriate status identifier in the response. As per MPEP 714 II. C. (E), "[t]o prevent delays in prosecution, the Office will waive certain provisions of 37 CFR 1.121 and accept alternative

status identifiers not specifically set forth in 37 CFR 1.121(c)." Claim 12 should be designated as withdrawn in future replies.

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. Numerous references were cited throughout the specification and not made of record.

Specification

I. The use of the trademark "Raney" has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

II. The specification does not contain the required sections.

These sections are required by the printers in the event a patent ever issues. Note that *at least* the "Brief Description of the Several Views of the Drawing(s)" is missing. All missing sections should be added. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

I. Claims 3, 5 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites “Raney metal.” Raney is a trademark of WR Grace & Co. - *see* www.graceraney.com. Trademarks in claims are indefinite, as they identify the source of origin versus what the material actually is. *See generally* MPEP 2173.05.

Claim 3 is not understood in light of the disclosure – energy generated to power an energy generator? Is any process step actually implied by this claim? If energy is already generated, how does it generate more energy? Does this somehow fit in the method of Claim 1, or is the “energy” being sent somewhere else to do something different?

In Claim 31, the “the gas flow from the reactor” limitation lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

I. Claims 1-4, 6-7, 13-17, 19, 28-33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al. in view of:

1. Mitsugi, et al., *WE-NET: Japanese Hydrogen Program*, Int. J. Hydrogen Energy 1998; 23(3): 159-165 (hereinafter “Mitsugi at ___”)
2. Jin, et al., *A novel gas turbine cycle with hydrogen-fueled chemical-looping combustion*, Intl. J. Hydrogen Energy 2000; 25: 1209-1215 (hereinafter “Jin at ___”)
3. US 5,775,091 to Bannister, et al.,
and further in view of US 5,618,875 to Baker, et al.

With respect to Claims 1-2, Porter teaches converting gaseous hydrocarbons into carbon and hydrogen. (Porter 1: 48-55) (hydrocarbon), (Porter 1:65 – 2: 7) (catalyst), (Porter 2: 35-47) (hydrogen production). *See also* (Porter 3: 24-25). Porter does not detail what is done with the hydrogen produced. Note also that Porter teaches temperatures of 500-800 C are needed for the reaction. (Porter 2: 22-24). Porter does not appear to describe the specific means for heating the hydrocarbon to that temperature (note however that the claims do not require any specific heating means). That said, use of hydrogen in power generation schemes is old and known. The Examiner takes official notice that it is. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides the following:

1. (Mitsugi at *e.g.* 163, col.2) (describing hydrogen combustion turbines and power generation).
2. (Jin at *e.g.* 1210) (describing hydrogen-fueled power systems, including combustion schemes).
3. (Bannister 1: 40 *et seq.*) (describing a hydrogen combustion power plant).

As to use of the electricity generated to heat the reactor, electric furnaces that heat to the temperatures recited in Porter are routinely used in similar reactions/processes. *See* (Baker 8: 30 *et seq.*) (describing a “clam shell type electric furnace”). One would be motivated to use the hydrogen generated/taught by Porter to generate power as taught and suggested by Mitsui, Jin

and Bannister in a furnace such as that described in Baker for any number of reasons, not the least of which would be reducing operating costs. This would make the process both cheaper and more efficient, both of which are motivations which bar patentability. *See e.g.* MPEP 2144 II. (*citing Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick*, 464 F.3d 1356, 1368, 80 USPQ2d 1641, 1651 (Fed. Cir. 2006) (“Indeed, we have repeatedly held that an implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when the improvement’ is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient. Because the desire to enhance commercial opportunities by improving a product or process is universal—and even common-sensical—we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves.”). As to Claim 3, notwithstanding the ambiguities noted above, at least the Bannister reference teaches an electrical generator. (Bannister 2: 38-39). It should be noted that the Mitsugi and Jin both suggest energy generation by virtue of the lengthy discussions of turbines, etc. As to Claims 4 and 6, Porter teaches catalysts. (Porter 1: 65 *et seq.*). The claimed metals are taught. *Id.* To the extent Porter does not state *in haec verba* “particulate catalyst,” note that similar processes employ particulate catalysts. *See* (Baker 5: 8 *et seq.*) (discussing suitable particle size). As to Claim 13, a furnace is an “air heating apparatus.” (Baker 8: 30 *et seq.*). As to Claims 14-17, Porter teaches that all of the hydrogen can be separated. (Porter 2: 44 *et seq.*). As to Claim 19, Porter suggests pure (*i.e.* greater than 50%) nickel. (Porter 1: 65 *et seq.*). As to Claim 28, methane is reasonably suggested. (Porter 1: 53) (alkanes). As to Claims 29-30, combinations, including carbon

monoxide are taught. (Porter 1: 51). As to Claim 31, and notwithstanding the ambiguities noted under the rejections under 35 U.S.C. 112 *supra*, a recycling operation is taught. (Porter 2: 35 *et seq.*). As to Claims 32-33, depending how these claims are interpreted, both batch and continuous processes are taught by Porter. *See* (Porter 2: 25 *et seq.*). Its continuous when it is running, and “batch” when the process is stopped. As to Claim 35, pressure swing adsorption is taught. (Porter 2: 47).

II. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al., Mitsugi, Jin, US 5,775,091 to Bannister, et al., and US 5,618,875 to Baker, et al. as applied to claim 1 above, and further in view of US 2004/0040304 to Wolff, et al.

The preceding discussion of Claim 1 is expressly incorporated herein by reference. With respect to Claim 8, to the extent Mitsugi, Jin, etc. *may* not disclose an internal combustion engine, Wolff does. *See e.g.* (Wolff 2: [0023] *et seq.*). One would be motivated to employ an internal combustion engine for similar reasons, including but not limited to creating electricity (Wolff 2: [0026]) and advantages appurtenant thereto. See discussion accompanying obviousness rejection I.

III. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al., Mitsugi, Jin, US 5,775,091 to Bannister, et al., and US 5,618,875 to Baker, et al. as applied to claim 1 above, and further in view of US 4,941,893 to Hsieh, et al.

The preceding discussion of Claim 1 is expressly incorporated herein by reference. Note that Porter states hydrogen can be removed by conventional techniques. (Porter 2: 44-47). To the extent membranes are not taught, this technique is equally known in the art. *See e.g.* (Hsieh

"Abstract"). Use of a known technique consistent with its known uses does not impart patentability.

IV. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al., Mitsugi, Jin, US 5,775,091 to Bannister, et al., and US 5,618,875 to Baker, et al. as applied to claim 1 above, and further in view of Mango, *The light hydrocarbons in petroleum: a critical review*, Org. Geochem. 1997; 26(7/8): 417-440.

The preceding discussion of Claim 1 is expressly incorporated herein by reference. Claim 18 requires the hydrocarbon be "taken direct from a hydrocarbon well." To the extent this feature is not taught by Porter, Mitsugi, etc., one of skill in the art would recognize that hydrocarbons come from hydrocarbon wells. The Examiner takes official notice that they do. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Mango. *See e.g.* (Mango "Abstract") ("The largest petroleum fraction is between C₁ and C₉, the so-called light hydrocarbons (LHs).").

V. Claims 5, 7, 20-27 and 36 rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al., Mitsugi, Jin, US 5,775,091 to Bannister, et al., and US 5,618,875 to Baker, et al. as applied to claim 1 above, and further in view of US 6,395,403 to Schmidt and Gao, et al., *Synthesis of carbon nanotubes by catalytic decomposition of methane using LaNi₅ hydrogen storage alloy as a catalyst*, Chemical Physics Letters 2000; 327: 271-276 (hereinafter "Gao at __").

The preceding discussion of Claim 1 is expressly incorporated herein by reference. Claims 5, 7 and 20-27 recite porous catalysts of varying particle size and surface areas. To the extent Porter, etc. does not teach porous catalysts, this does not impart patentability. Porous catalysts are recognized by those of skill in the art as having higher catalytic activity. US 6,395,403 to Schmidt states:

The porous base metal catalyst product is normally referred to in terms of the metal which is the major component of the spongy metal product. These high surface area products have been found to have sites for hydrogen activation and, thus, exhibit catalytic activity when used in hydrogen reduction reactions.

(Schmidt 1: 30-35). Even though Schmidt teaches the same metals as Porter, and the same as those disclosed by Applicants and claimed by Applicants, to the extent Schmidt can somehow be characterized as teaching a different reaction as that which is being claimed (even though passing a hydrocarbon over a catalyst is all that is being claimed), *and* to the extent this can properly be characterized as a "teaching away" that outweighs the advantages cited above, note that the same porous catalysts have been used in what appear to be the same reaction disclosed (*i.e.* catalyst + methane = carbon + hydrogen). *See* (Gao at 272, col. 1). Thus, it is submitted that the substitution is an obvious expedient, due to the catalytic activity explicitly taught in the prior art. With respect to size and surface area, these limitations are an extension of the teachings of Porter. Note that Porter teaches that "[t]he reaction takes place under suitable catalytic pyrolysis conditions. Typically, these conditions depend on such variables as temperature, pressure, and the nature, quantity, and flow rate of the hydrocarbon feed. In general, suitable conditions are those under which the feed/carrier combination contacts the catalyst and microfibrinous carbon is formed." (Porter 2: 15-18). Changing the size of the catalyst particles in turn affects surface area, needed to scale up the reaction, etc.

With respect to Claim 36, to the extent this claim merely repeats the limitations discussed in connection with Claim 1 *supra* with the addition of a porous catalyst, the preceding discussions are relied upon.

VI. Claim 34 rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,435,376 to Porter, et al., Mitsugi, Jin, US 5,775,091 to Bannister, et al., and US 5,618,875 to Baker, et al. as applied to claim 1 above, and further in view of US 5,046,247 to Oguro, et al.

The preceding discussion of Claim 1 is expressly incorporated herein by reference. Note that Porter states hydrogen can be removed by conventional techniques. (Porter 2: 44-47). To the extent metallic hydrides are not taught, Oguro teaches use of metal hydrides for hydrogen adsorption. *See* (Oguro 1: 12 *et seq.*). Use of a known material (metal hydrides) consistent with its known uses in a manner suggested by the prior art (Porter) would be obvious to one of skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL C. MCCracken whose telephone number is (571)272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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